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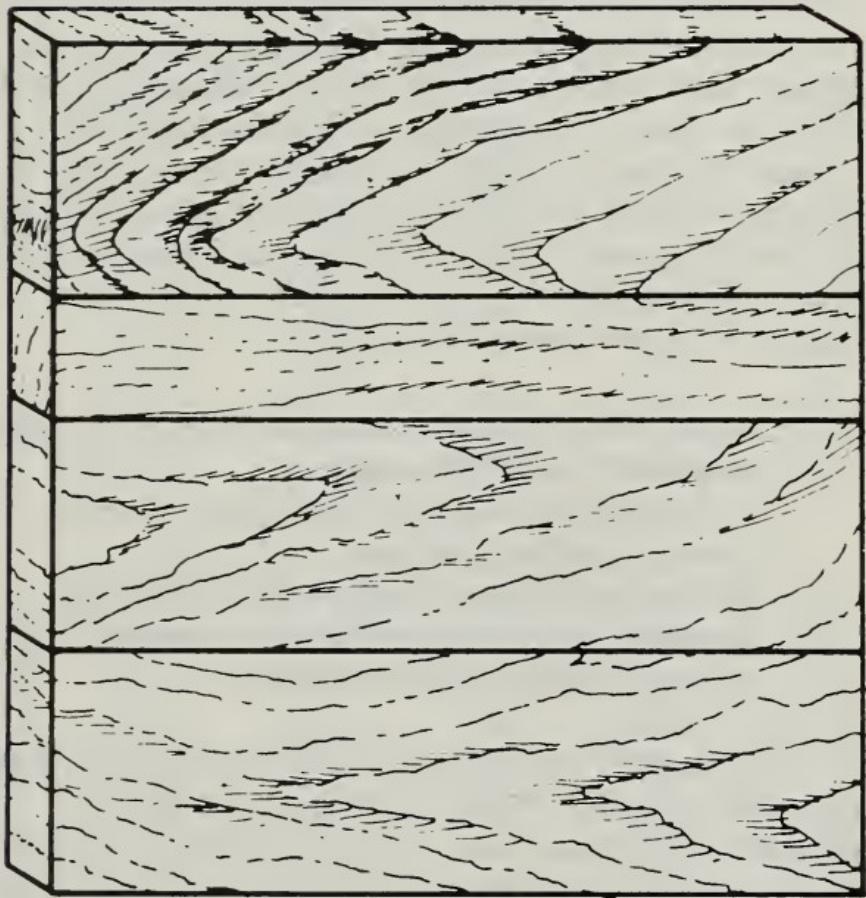


ASD 354  
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IND/STA

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# The Dollars and Cents of Conventional Processing of Standard-Size Blanks



United States  
Department of  
Agriculture

PREPARED BY  
Forest  
Service

Northeastern Forest  
Experiment Station  
NE-INF-43-83

## *245* The Dollars and Cents of Conventional Processing of Standard-Size Blanks

by Philip A. Araman and Bruce G. Hansen

Manufacturers of furniture and cabinets normally use over 2 billion board feet of hardwood lumber or about one-third of all hardwood lumber demanded each year. Although the current market for hardwood lumber reflects the overall economic downturn, competition for limited better grade hardwood resources will intensify when the economy improves. So, we need to improve the utilization of the abundant lower grade hardwood resource to assure adequate supplies at reasonable prices.

A breakthrough toward this end came when we found that nearly all of the thousands of individual dimension-part sizes used by the industry could be obtained from as few as a dozen blank sizes (wide edge-glued panels) per required thickness. Then, we developed the standard-size blanks concept (Araman et al. 1982). Conventional processing of low-grade lumber directly into rough-dimension cuttings is difficult. But, making standard edge-glued blanks and then processing blanks into rough-dimension cuttings holds promise because when making blanks:

- up to 12 lengths can be cut at one time with a longest length first cut-off technique,
- random-width cuttings can be utilized and edge glued into wide blanks, and
- flexible inventories of blanks can be maintained; therefore, costly rough-mill undercutting and over-cutting problems can be eliminated.

To evaluate the economic feasibility of producing blanks from log-run lumber (No. 2 Common and Better), we designed and simulated operation of a modern conventionally equipped plant to process 16 Mbft (thousand board feet) into 9.6 Mbft of  $\frac{4}{4}$  or  $\frac{5}{4}$  blanks per shift (Fig. 1).

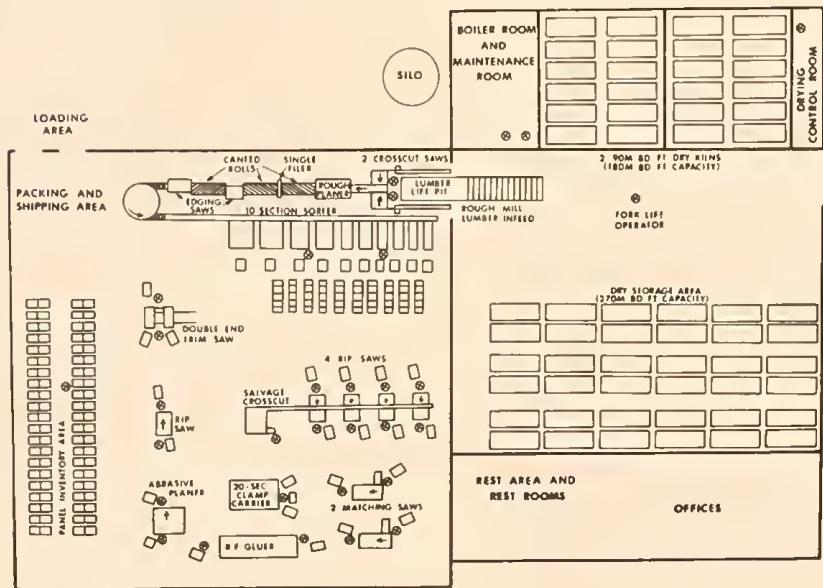
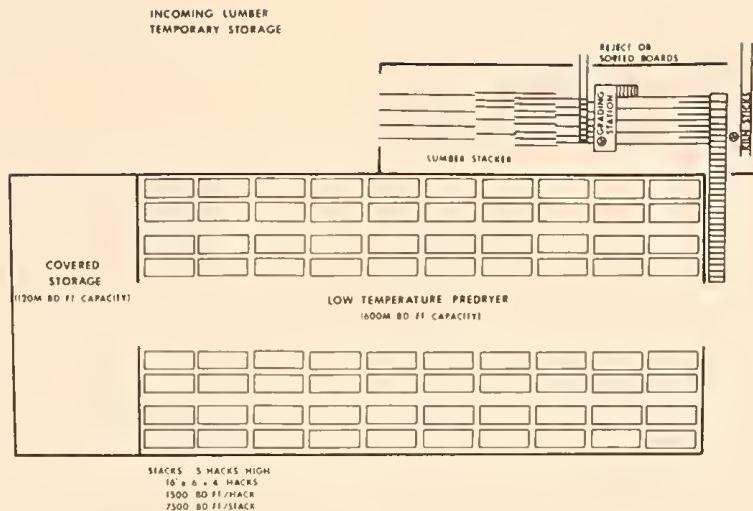
### Raw Materials and Product Yield

We used 70 percent  $\frac{4}{4}$  and 30 percent  $\frac{5}{4}$  green, log-run red oak lumber to produce the standard-size blanks. The log-run grade mix contained 9 percent FAS (First and Seconds), 5 percent Select, 45 percent No. 1 Common, and 41

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Figure 1.—Blanks plant layout.



percent No. 2 Common. The lumber input cost of \$333 per Mbft was based on a weighted average market price for the different grades of both  $\frac{4}{4}$  and  $\frac{5}{4}$  red oak lumber plus a \$40 delivery charge.

A blank yield of 60 percent was estimated by combining:

- a 6-percent shrinkage loss,
- the log-run grade mix,
- blank sizes and frequencies needed to meet solid furniture dimension requirements (Araman et al. 1982),
- dimension yield tables by Englerth (1969), and
- a  $2\frac{1}{2}$ -percent operator error deduction.

## Economics

Table 1 presents summaries of the annual cash flows used to derive internal rate-of-return estimates of 26 to 40 percent for one or two shifts, respectively, for a new plant costing approximately \$3 million. Investment sensitivity to changes in key input items is illustrated in Figures 2 and 3 for the one- and two-shift operations. Production consists of 70 percent  $\frac{4}{4}$  and 30 percent  $\frac{5}{4}$  clear-quality red oak blanks. Blanks are sold at an average of \$1.80 per square foot.

Table 1.—Estimated cash flows (in thousands of dollars)

Year	Revenues	Operating costs	Depreciation <sup>a</sup>	Taxes <sup>b</sup>	After-tax <sup>c</sup> earnings
1-SHIFT (full production in second year)					
1	1,957	1,347	329	129	481 <sup>d</sup>
2	3,914	2,230	492	548	1,135
3	3,914	2,230	464	561	1,122
4	3,914	2,230	435	574	1,109
5	3,914	2,230	423	580	1,104
6	3,914	2,230	83	736	947
7	3,914	2,230	71	742	942
8	3,914	2,230	71	742	942
9	3,914	2,230	71	742	942
10	3,914	2,230	60	747	937 <sup>e</sup>
2-SHIFT (full production in third year)					
1	1,957	1,347	329	129	481 <sup>d</sup>
2	3,914	2,230	492	548	1,135 <sup>d</sup>
3	7,828	4,231	464	1,441	2,156
4	7,828	4,231	435	1,455	2,143
5	7,828	4,231	423	1,460	2,137
6	7,828	4,231	83	1,616	1,981
7	7,828	4,231	71	1,622	1,975
8	7,828	4,231	71	1,622	1,975
9	7,828	4,231	71	1,622	1,975
10	7,828	4,231	60	1,627	1,970 <sup>e</sup>

<sup>a</sup>Depreciation is based on Accelerated Cost Recovery System percentages for property placed in service between 1981 and 1984.

<sup>b</sup>Income is taxed at 46 percent.

<sup>c</sup>After tax earnings = after tax profit + depreciation.

<sup>d</sup>Actual net cash flows will be less due to additions made to working capital.

<sup>e</sup>Actual net cash flows are larger due to a return of working capital and assumed sale of assets at book value.



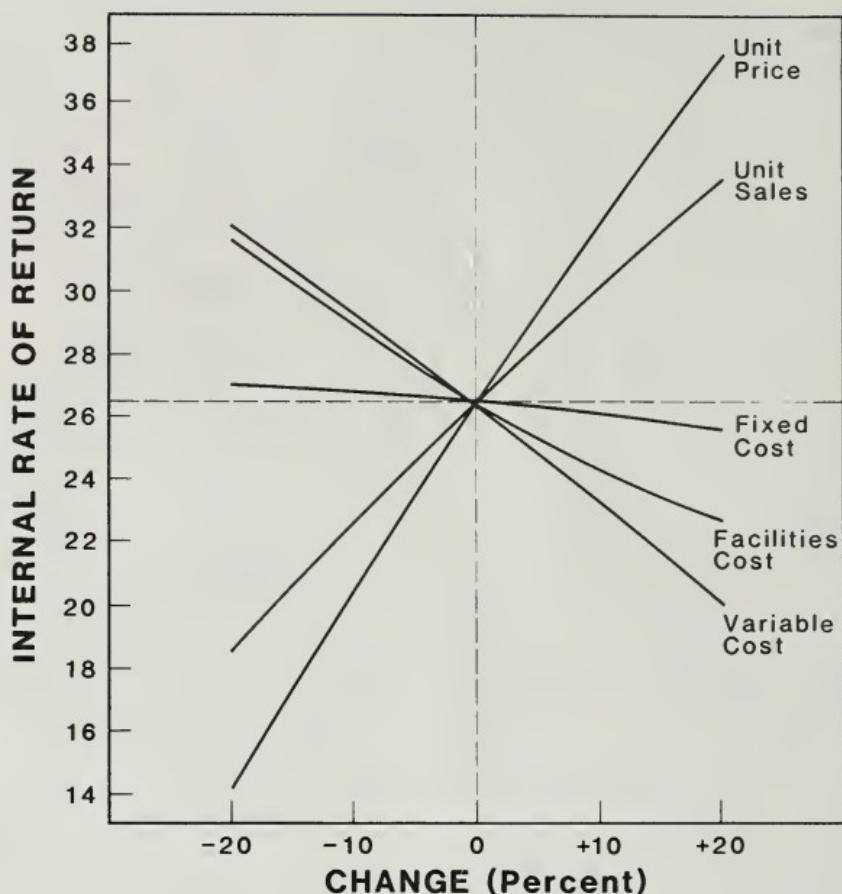


Figure 2.—Internal rate-of-return sensitivity to changes in selected investment parameters (single shift).

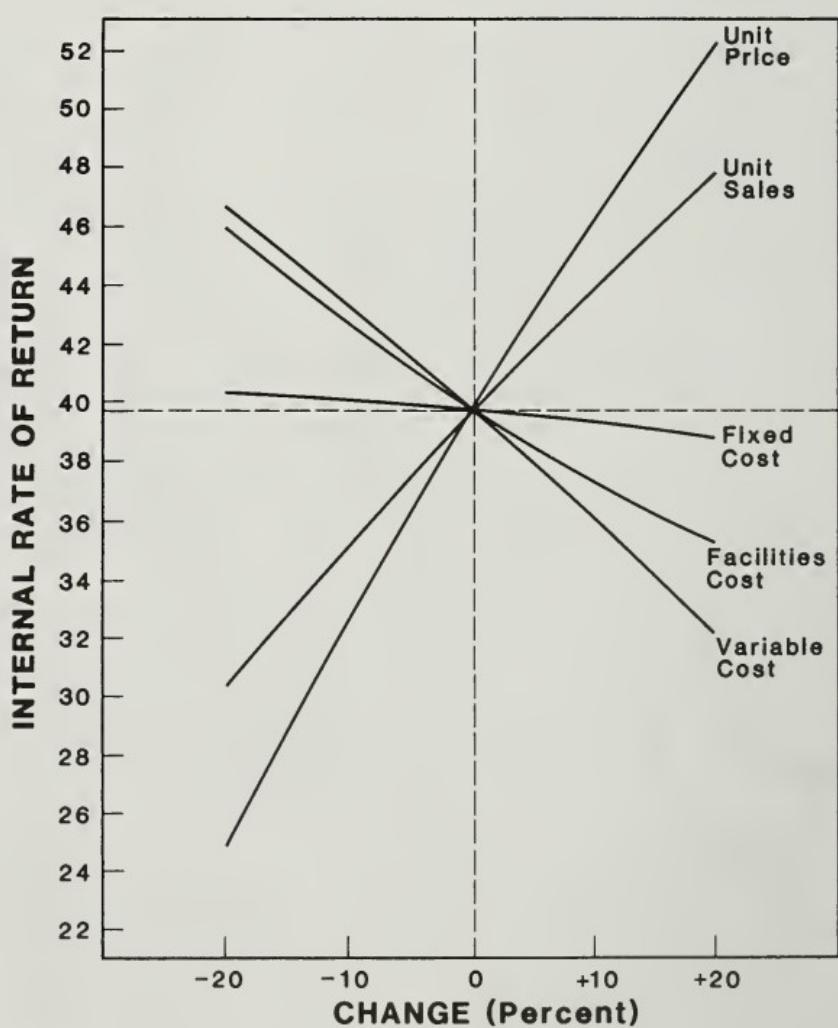


Figure 3.—Internal rate-of-return sensitivity to changes in selected investment parameters (two shifts).

Table 2.—Accounting-based cost estimates for producing standard-size blanks by different percentages of capital investment depreciated on a straight-line basis over 10 years

Item (Dollars/ft <sup>2</sup> )	Capital investment <sup>a</sup>				
	0%	25%	50%	75%	100%
<b>1-SHIFT COSTS</b>					
Depreciation	0.000	0.033	0.065	0.098	0.130
Operating cost <sup>b</sup>	.940	.940	.940	.940	
Total cost of production	0.940	0.973	1.005	1.038	1.070
<b>2-SHIFT COSTS</b>					
Depreciation	0.000	0.016	0.033	0.049	0.065
Operating cost <sup>c</sup>	.887	.887	.887	.887	
Total cost of production	0.887	0.903	0.920	0.936	0.952

<sup>a</sup>Excludes land and sundry cost totaling \$90,000.

<sup>b</sup>Variable manufacturing cost = \$0.822/ft<sup>2</sup>; fixed manufacturing cost = \$0.118/ft<sup>2</sup>.

<sup>c</sup>Variable manufacturing cost = \$0.807/ft<sup>2</sup>; fixed manufacturing cost = \$0.080/ft<sup>2</sup>.

From an accounting-based perspective, the cost of blanks for internal use ranges from \$0.89 to \$1.07 per square foot depending on the amount of new investment required and level of operation (Table 2). This cost for blanks compares favorably with costs reported by those operating their own rough mills. Therefore, conventional processing of standard-size blanks would be profitable whether produced for sale or for internal use.

## Discussion

The manufacture of standard-size blanks for open-market consumption seems to have several important advantages that may strengthen its chance for success. First, it utilizes log-run lumber that contains 40 percent or more No. 2 Common lumber—a grade traditionally avoided by manufacturers of fine hardwood furniture and cabinets. Second, the process is based on existing technologies. Third, because standard-size blanks can be inventoried, a manufacturer of standard-size blanks would be able to respond in a flexible, timely manner to internal or customer demands. These attributes make standard-size blanks an attractive supplemental as well as primary source of solid wood material. Finally, the manufacture of standard-size blanks seems

profitable; and if operated on a two-shift basis, it seems to rank among the better investment opportunities available within the hardwood dimension industry.

The manufacture of blanks by existing producers of furniture, cabinets, and other wood products seems to be even more promising. In existing industries, the demand for blanks should be more predictable as it would be derived from existing markets for the firm's products; production costs would be comparable or lower than existing dimension processing costs; and an external market for blanks could be developed to augment internal demand.

## Literature Cited

- Araman, Philip A.; Gatchell, Charles J.; Reynolds, Hugh W.  
Meeting the solid wood needs of the furniture and cabinet industries: Standard-size hardwood blanks. Res. Pap. NE-494. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1982. 27 p.
- Englerth, George H. Charts for calculating dimension yields from hard maple lumber. Res. Pap. FPL-118. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory; 1969. 12 p.